# Young Soil Doctor: Student-Teacher-Scientist-Community Collaboration Research Project on Sustainable Land Development Activities in Thailand

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## Abstract

The use of unsuitable land for agriculture caused land degradation. Not only soil erosion and soil organic matter deficiency occurred but also saline soil, acid soil, and sandy soil covered in large areas and impacted to the farmer's living about 30 million people which are the most of the people in Thailand. Most of the forested watershed area of the Kingdom was destroyed through the notorious shifting cultivation practices cutting down forest of the hill tribes. Such long deteriorating conditions immensely reduced the water retention capacity of the watershed. The loss of the forest-cover areas would increase the rate of soil erosion and further worsen the fertility status of the soils.

His Majesty the King of Thailand has long been exposed to those soil problems through constantly visiting every region of the country. His Majesty's concerned and initiative dedicated to solving the problems and sustaining of natural resources usage of the Kingdom lead to many "Royal Development Projects Regarding Environment"

Being trained as effective "Young Environmental Scientist", GLOBE student can successfully work as "Young Soil Doctor" in collaboration with farmers, "Volunteer Soil Doctors", soil scientists from the universities, from Land Development Department, and from Royal Development Projects in their local communities. GLOBE students can share their GLOBE experiences in using rational inquiry and standardized measurements of different soil protocols with community's expertise and local wisdom to identify soil problems, explain and predict soil phenomena, and search for the answers of those soil problems on agriculture, natural resources, and environment focuses for the benefit of their communities.

The Institute for the Promotion of Teaching Science and Technology as Thailand GLOBE Country Coordinating Agency with the cooperation of Land Development Department has created the "Young Soil Doctor Project" based on "Student-Teacher-Scientist-Community Collaboration Research" approach since the year 2005 and scale up to be "The Special Project in the occasion of The Sixtieth Anniversary Celebrations of His Majesty's Accession to the Throne" in the year 2006. At present, 194 $4^{th}$ -$12^{th}$ grade students, 95 teachers from 81 GLOBE schools all over Thailand are involved in this project. The expertise and mentoring functions of concerned agencies of all parts of Thailand are pooled. The focus is on the major soil problems in each part of Thailand such as peat soil and acid soil in the southern part, saline soil in the northeastern and eastern part, soil erosion in the dry and sandy soil due to cultivation, compact clay, infertile soil and severe drought in the central part, the development and conservation of watershed areas for protection against flooding in the northern part, the cultivation of vetiver grass which aims to control soil erosion and maintenance of soil moisture in every parts of Thailand.

**Keywords:** Young Soil Doctor, Collaboration Research, GLC, soil problem and soil conservations

**Background of the project**

The unsuitable land use for agriculture has been a major land degradation problem . Not only soil erosion and soil organic matter deficiency but also saline soil, acid soil, and sandy soil cover very large areas and impact about 30 million farmers which are the most of the people in Thailand. Most of the forested watershed area of the Kingdom was destroyed through the notorious shifting cultivation practices cutting down forest of the hill tribes. Such long deteriorating conditions immensely reduce the water retention capacity of the watershed. The loss of the forest-cover areas will increase the rate of soil erosion and further worsen the fertility status of the soils.

***Figure1&2****: lowland paddy fields in Narathiwat province. His Majesty observed that, after the swamps have been drained, the soils has grown strongly acidic and that crops planted by the farmers had failed. (http://www.ldd.go.th/new_hp/King/4.html)*

His Majesty the King of Thailand has long been exposed to those soil problems through constantly visiting every region of the country. His Majesty's concern and initiative dedicated to solving the problems and sustaining of natural resource usage of the Kingdom led to many "Royal Development Projects Regarding Environment"

To reciprocate His Majesty's initiative, promote and develop young generation understanding and solving the soil problem in their community by using Inquiry and scientific method, The Institute for the Promotion of Teaching Science and Technology, as Thailand GLOBE Country Coordinating Agency, with the cooperation of Land Development Department has created the "Young Soil Doctor Project" based on "Student-Teacher-Scientist-Community Collaboration Research".

***Figure3:*** *Successions of His Majesty's visits to rural areas throughout all regions of the country made him realize the problems of poverty and backwardness Thai farmers are facing. He is determined to improve and promote the well-being of poor farmers to become self-reliant and thus contribute to the strengthening of the whole country. (http://www.ldd.go.th/new_hp/King/4.html)*

**Objectives of the project**

- To encourage students to use GLOBE strategies and protocols to identify and solve local soil problems as "Young Soil Doctor" through Teacher–Scientist–Community Collaboration Research
- To promote scientific attitude and skill including awareness, understanding, responsibilities, and behavior changes about natural resources and environment of the students and communities.

**Goal**

- Young Soil Doctors with 100 researches from different parts of the country in three years (2006-2008)

**Expected Outcomes**

- In collaboration with teachers; soil scientists from the universities, from Land Development Department, and from Royal Development Projects and farmers "Volunteer Soil Doctor", student as "Young Soil Doctor" should be able to use inquiry, scientific process, higher order of thinking and standardized measurement of different soil and related protocols to identify and explain soil problems in their local communities and propose appropriate solution to solve those problems

- Student should have the understanding and awareness of environmental issue concerned awareness and participate with local community to conserve their communities.

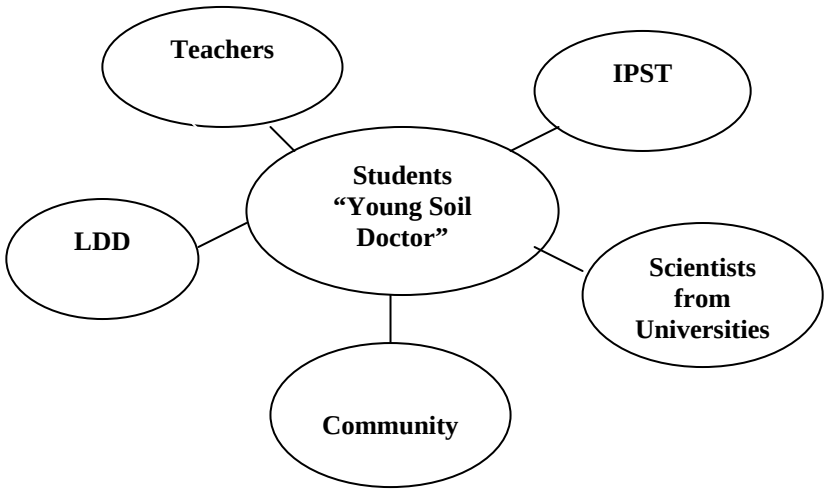
**Strategy and Procedure**

**Strategy**

Collaboration work is Yong Soil Doctor's strategy. The partners from Land Development Department, regional universities, community and IPST are cooperating Young Soil Doctor Project.

The Role of Each Partner:

- Land Development Department, i.e. Regional Land Development Sectors, local soil scientists, community soil experts, provide the young soil doctor with consultation on soil problems and soil conservation, the instruments, soil test kits, workshop accommodations and consulting the project.
- Four regional GLOBE university partners (Central, Northern, Northeastern and Southern) set up the research camp for the teachers and students. During the research scientists from universities will be the consultants and follow up the student research projects.
- Community provides local wisdom about preserve soil and natural resources.
- GLOBE Project, IPST supports fund, Teacher Guides, GLOBE instruments to run project. It also coordinates all partners to work together. GLOBE IPST consults and follows up the student research and promotes the products in local and international



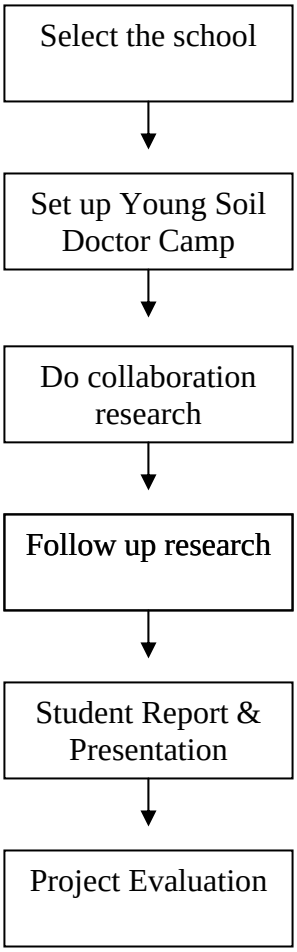

***Picture 1:*** *Diagram of collaboration among student-teacher-scientist and community*

**Procedure**

1. Scientists selected the schools
2. Scientist, LDD and IPST trained students and teachers using Students–Teacher–Scientist– Community Collaboration Researches strategy concerning

local soil problems. The Training covered GLOBE Protocol, Basic knowledge of Soil, Soil problem soil conservation and land management by using basic and advance soil Protocols and related GLOBE Protocol such as Land Cover Protocol, Atmosphere Protocol and Hydrology Protocol. Students developed soil research proposal in Inquiry Research Methodology.

3. Students did collaboration research
4. Scientists, LDD and IPST followed up,
5. Students present and disseminate their research
6. IPST evaluate the project in each year and at the end of project.




***Picture 2:*** *Flow Diagram of Young Soil Doctor Project*

**Past and Ongoing Implementation**

Many project activities took place since June, 2005, as described below.

**During the year 2005:**

1. Partner collaborations and the pilot Young Soil Doctor Camp
    1) On June 15-19, 2005, The Yong Soil Doctor Project, GLC Prototype started at Hauy-Sai Royal Project, Petchaburi Province. Twenty-tree teachers and twenty-eight students, fourteen schools from 3 Provinces, Rachaburi, Petchaburi and Prachuabkirikhan.
2. Researches follow up visits
    1) On December 20-23, 2005, follow up visits on Young Soil Doctor Project was conducted for 11 pilot schools in Rachaburi, Petchaburi and Prachuabkirikhan Province.

**During the year 2006:**

1. Partner Collaborations
    1) On February 24-25, 2006, GLOBE Partner Network Meeting was held to introduce Young Soil Doctor Project and design the collaboration plan in every region of Thailand. Representatives from 4 GLOBE region centers got together to clarify the project and develop the action plan and Young Soil Doctor Camp.
    2) On May 9, 2006, the Memorandum of Understanding of the Collaboration in GLOBE Young Soil Doctor Project was signed between IPST and the Land Development Department at the Land Development Department Office.


***Figure 4:*** *The Land Development Department and IPST signed MOU to cooperate the Young Soil Doctor Project.*

    2) On August 28, 2006, The GLOBE staff were trained to use the new soil test kit that developed by Central Laboratory, Agriculture Faculty, Chiang Mai University, Chiang Mai province. This soil kit would be used for the Land Development Department.

2. Young Soil Doctor Camp

1) On April 3-7, 2006, GLOBE Northeastern Partners Conducted Young Soil Doctor Camp at Ratchabhat Nakhornrachasima University, Nakhornrachasima province. Sixteen teachers and thirty-two students from sixteen schools participated in the camp. Sixteen research proposals were submitted by the schools.
2) On April 24-28, 2006, GLOBE Northeastern Partner conducted Young Soil Doctor Camp at Ubonrachathani University, Ubonrachathani province. Eight teachers and sixteen students from four schools participated in the camp. Four research proposals were submitted by the schools.
3) On May 24-26, 2006, GLOBE Central Partner conducted Young Soil Doctor Camp at Chonduer National Park, Nakhornsawan province. Seventeen teachers and thirty-four students from seventeen schools joined in the camp. Seventeen research proposals were submitted by the schools.
4) On June 15-18, 2006, GLOBE Northern Partner conducted Young Soil Doctor Camp at Land Development Department Training Office in Chiangmai, Chiangmai province. Twenty teachers and forty students from twenty schools joined in the camp. Twenty research proposals were submitted by the schools.
5) On July 1-4, 2006, GLOBE Southern Partner conducted Young Soil Doctor Camp at Chulabhorn Rachawittayalai Trang School, Trang province. Eleven teachers and fourty-four students from ten schools participated in the camp. Ten research proposals were submitted by the schools.

3. Researches follow up visits

1) On March 3, 2006 and March 6, 2006, GLOBE Thailand staff visited 11 school members of GLOBE Young Soil Doctor Project at Petchaburi and Prachuabkirikhan Province to give advice on the research proposal.
2) On May 17, 2006, follow up visits on Young Soil Doctor Project was conducted for Ban Pu Wai School, Petchaburi province and Paknampranwittaya School, Prachuabkirikhan province.
3) On August 29-30, 2006, GLOBE staff visited four northern young soil doctor schools in Chiang Mai.

**Present (the year 2007):**

1. Partner Collaborations

1) On April, 2007, the Land development Department supported 200 soil test kits to IPST for Young Soil Doctor Researches and GLOBE workshops.
2) In June 29-30, 2007, GLOBE Partner Network Meeting including the Land Development Department, four GLOBE Partners and GLOBE IPST was held to revise the action plan and develop strategy for more effective project. The research guide and administration guide were perused.


***Figure 5&6:*** *TheLand Development Department soil test kits. (Ban Mae Khao Tom Luang School Presentation)*

2. Researches follow up visits

1) On May 24-25, 2007, GLOBE staff visited two northern young soil doctor schools in Chiang Rai.

Until now, there are 194 students and 95 teachers in 81 schools working on soil problem research. Most of the research topics are about utilizing of organic matter for agriculture, This year (2007) we encourage Young Soil Doctor carry out more research the soil in more extensive aspects, e.g. soil problems and soil management such as soil and water conservation, watershed hydrology, acid and organic soil improvement, soil salinity and the benefits from the Royal Project Initiative.

Moreover, in the Exhibition on the Forty-third Anniversary of the Land Development Department at the Land Development Department Office on May 23-25, 2006, GLOBE Young Soil Doctor students from Petchaburi, Prachuabkhirikhan and Nakhornrachasima provinces presented three research projects to Her Royal Highness Princess Maha Chakri Sirindhorn. In addition, 4 Young Soil Doctor Researches were selected to present in 10th GLOBE Annual Conference on poster.

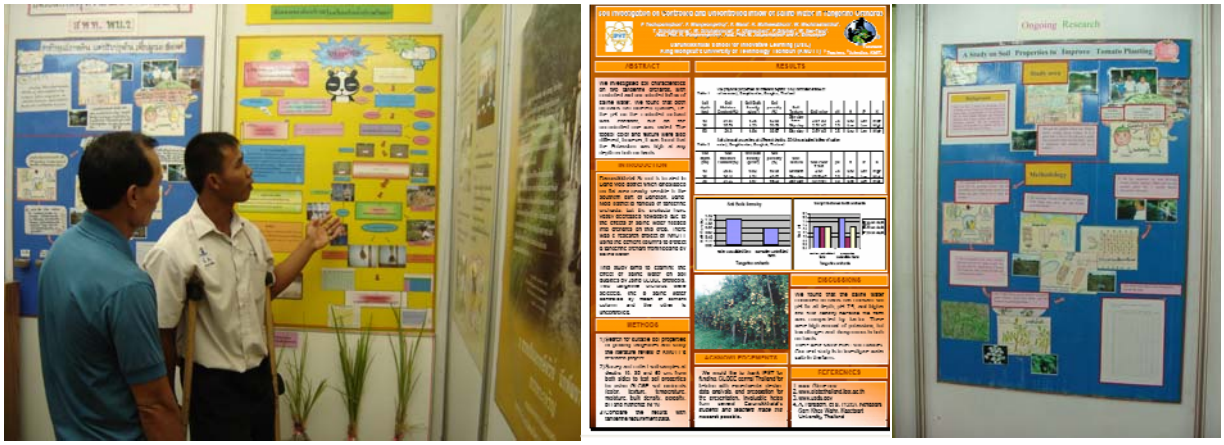


***Figure 7, 8 & 9:*** *On the left; Young Soil Doctor presented their research in the 43rd Anniversary Land Development, in the middle and on the right; an example research posters presented in the 10th GLOBE Annual Conference, Phuket Province, Thailand.*

**Conclusion and Key Findings**

After we have run the project since 2005, we found there are many benefits from Young Soil Doctor Project which are;

- The cooperation among teacher, scientist and community to promote the student learning (an excellent model to run student's research project)
- Developing knowledge, skill and scientific thinking to student.
- Learning together among teacher-student-scientist-community and applying the result to solve their local problems.

The learning from young soil doctor camp also implemented in many occasions in school and community such as science club, science camp and using the research results to benefit their communities. An Example Young Soil Doctor School, e.g. Ban Pu Wai School in Petchburi Province, Paknampran Wittaya School in Prachuabkirikhan Province, Tanthongwittaya School and Mae Khao Tom Luang School in Chaing Rai Province. They are all in the rural area and using the advantage from their project to solve soil problem in their communities.


***Figure 10&11:*** *Young Soil Doctor Project implemented in school, on the left; forest plantation in Ban Mae Khao Tom Luang community and on the right; science club in Thanthongwittaya School.*

**Key Findings**

Three years past, we found there are keys to success;

- The strong collaboration among teacher, scientist and community by consulting and advising will help the research to meet the target.
- The teacher is the key person to run the project besides the strong collaborations. The teacher role is the facilitator, supporting tools and knowledge and motivates students to do research.
- The supporting and funding will help schools to complete research on time.
- The school size is not the main key to a successful project. Although a big school usually has more effective teachers and more facilities, sometimes a small school in rural can complete the project because their environmental surrounding such as farming and agriculture provide opportunities to integrate the inquiry to real life application.
- The continuing follow up the project by teacher, scientist, and Land Development officer is also the important key to success.

**Acknowledgement**

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